

# MULTIPLE EVAPORATOR INSTALLATIONS

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Evaporators have changed little since the 1880's; flue pans and flat pans in varied arrangements have been used over this 75 to 80 year period. Each arrangement has been backed by a large number of users. In more recent past, man labor has become the scarce and expensive commodity with the result that the producer with growing markets has attempted to develop ways and means of handling more sap in a working day.

Early attempts were to produce single epeporators which were longer and wider than their predecessors. A more realistic and flexible development was the use of multiple evaporators, passing the sap through a series of units to be finished in the final pan of the last evaporator.

More recent trends, largely dependent, but not completely so, on the widespread use of oil fired evaporators, has been the development of a series of flue pans through which sap passes to the finishing pan. Experience with this setup in New York has been excellent and adoption by large producers has been very rapid. Among the advantages of such an installation is the possibility of growth of the enterprise as markets for sirup develop; its flexibility since any number may be run at any time, however if breakdown occurs that evaporator may be bypassed; oil burners are more easily adapted to small evaporators; the reasonable cost of installation; and the economy of manpower to operate the setup.

**General Information.** Since every operation in the country varies, consideration must be given to local conditions in developing the installation. Numbers of tapholes as a single factor is a poor base from which to figure. Are the taps roadside (sweeter generally) or woods

trees (less sweet)? Is the installation in the northern limits of maple production (fewer quarts of sap per tap) or in the southern part of the range where sap may be produced in greater volume in a longer season? Are you, the operator, willing to operate your installation 10 hours daily or 24 hours?

Using 2.5% sugar sap (2.5° Brix) a 5' x 12' evaporator will produce a about 5 gallons of sirup per hour while a 5' x 14' produces about 6 gallons. By adding a 5' x 10' flue pan ahead of either of these outfits, 3 1/2 gallons of sirup will be added; adding two, 7 gallons per hour; three, 10 1/2, thus a 5' x 14', plus three 5' x 10' flue pans produces on an average 16 to 16 1/2 gallons per hour, 160 gallons per 10 hour day, or 380 to 390 gallons in a 24 hour steady operation. From the above figures the operator should be able to figure for himself how many units will be needed based on production he requires rather than the number of taps expected to be handled.

**Source of heat.** Oil is the most convenient and steady source of heat. With large volumes being used in short periods of time (6 to 10 weeks of operation), it is possible to obtain a price advantage of 2¢ to 3¢ per gallon where bids are requested.

For a 5' x 10' flue pan, a burner with 12 to 14 gallons per hour capacity is needed. A 5' x 12' evaporator needs 12 to 13 gallons per hour or a 5' x 14' requires 14 to 16 gallons per hour. (See Bulletin ARS-73-40 "Arches and Burners for Oil-Fired Maple Sap Evaporators, Jan. 1963, Agricultural Research Service, U. S. D. A.) The heat used in a 5' x 10' flue pan can be as much as that in a larger evaporator (5' x 13') since undiluted sap or partially concentrated sap will not scorch. High

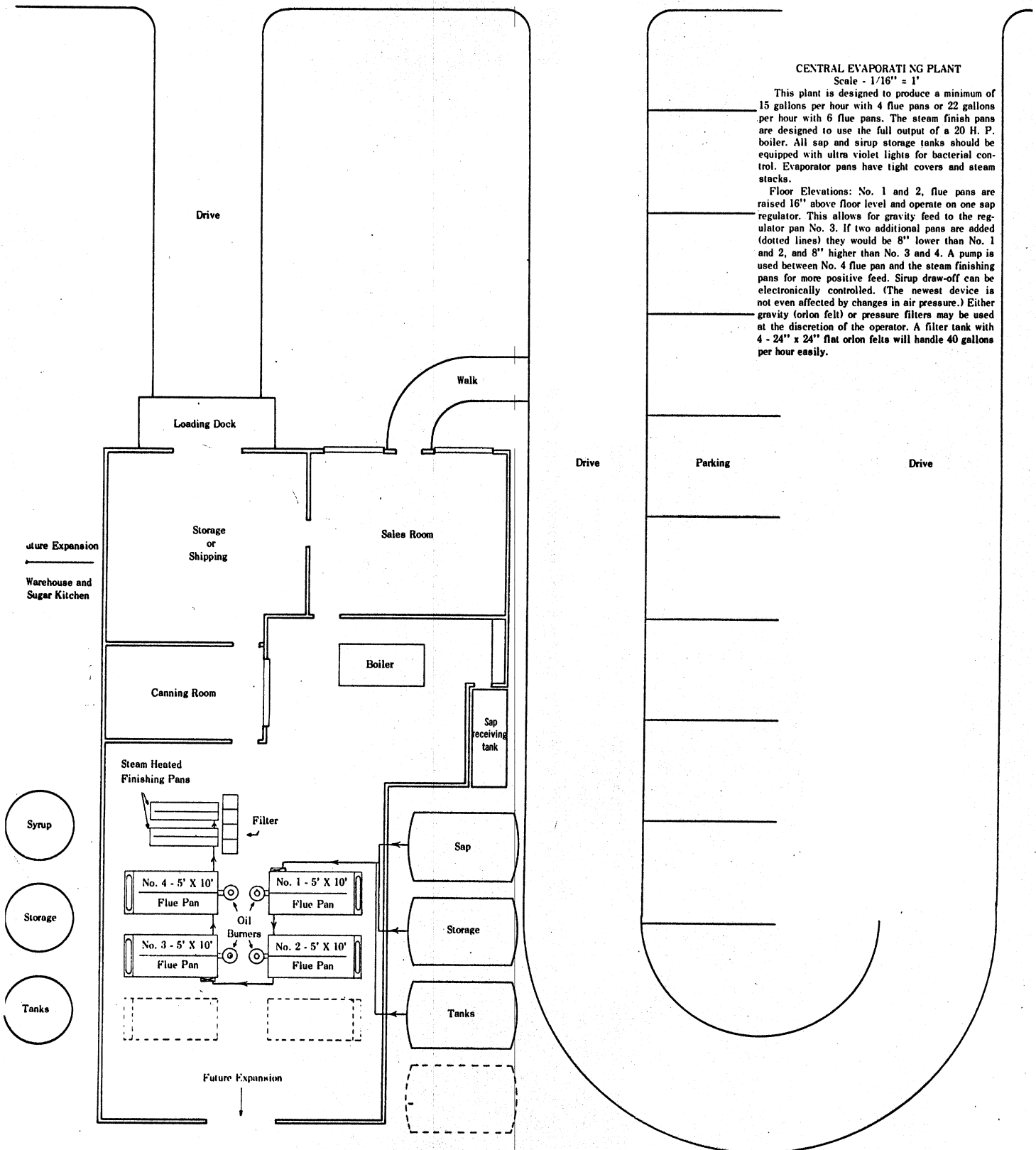
pressure gun-type conversion oil burners without controls and with a capacity of 8 to 15 gallons per hour may be purchased for as little as \$219.50; with a 15 to 30 gallons per hour capacity the cost would be \$349.50.

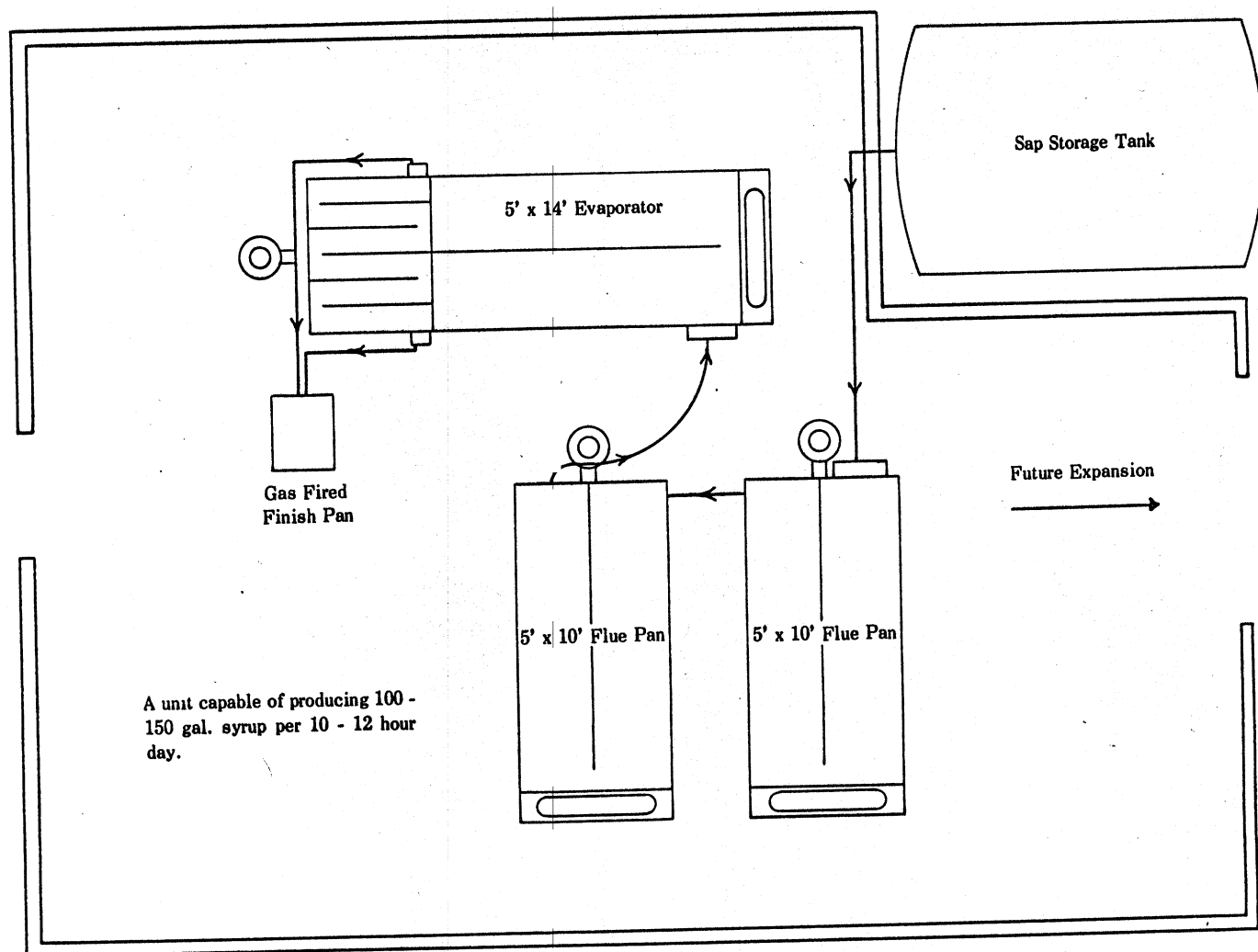
**Evaporators.** In practice the usual evaporator used for this setup has been the two pan unit which is simpler to operate and with fewer bottlenecks to slow flow. The flue pan may be set up for either two or three pass (1 or 2 partitions) but the 3 pass is only used when direction of flow makes this necessary, it has no other advantages. Sirup pans of 6 compartments are used for better control and less mixing and hold back time.

Expense of such a setup may be estimated from the following costs:  
5' x 12' - evaporator pans 9' flue 3' sirup pan, about \$690.00.  
5' x 14' - evaporator pans 10' flue 4' sirup pan, about \$775.00.  
5' x 10' flue pan about \$650.00.

On a new installation, a 5' x 12' evaporator would not be recommended, rather a 5' x 14' unit should be used. This allows for 10' flue pan for faster boiling and 4 foot sirup pan which will adequately handle more flue pans and 5' x 14' works equally well with oil burners. Besides this, the flue pan units are interchangeable on all units.

One factor that is very important is to allow adequate flow between units. The outlets on many flue pans are of sufficient size since with larger setup, larger volume of sap must be moved faster. A two inch diameter conductor between flue pans will be large enough provided the entire diameter is used. This can be accomplished in a raised flue evaporator by placing outlets down at the bottom of the flues. In a drop





flue pan possibly two or three conductors will be needed. Each unit is equipped with tight-fitting steam covers and stacks for control of steam and, more important, for the easy visibility within the sugar house.

There are many reasons for the development of multiple evaporator installations. Above all, with reasonable planning, expansion can be orderly and done without disturbing existing installations. Costs of equipment are reasonable as are

costs for fuel. Breakdown of units during rush season are less serious than where individual evaporators are broken down. The flexibility of the setup allows the use of all units or any part of the total units with ease.

